

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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In the matter

Service Rules for the 746-764 and
776-794 MHz Bands, and Revisions
to Part 27 of the Commissions Rules

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WT Docket No. 99-168

To: The Commission

OPPOSITION TO PETITION FOR RECONSIDERATION

Respectfully submitted,
ArrayComm, Inc.

By: _____ /s/
Marc Goldberg
Director, New Technologies

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September 15, 2000

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OPPOSITION TO PETITION FOR RECONSIDERATION

ArrayComm, Inc. (“ArrayComm”), pursuant to FCC Rule Section 1.429 opposes Motorola, Inc.’s August 11, 2000 petition for reconsideration of the Commission’s Memorandum Opinion and Order and Further Notice of Proposed Rulemaking in this proceeding, 15 FCC Rcd ___, FCC 00-224 (June 30, 2000) (“*Reconsideration Order*”), and shows the following:

1. As ArrayComm explained in its previous filings in this proceeding, it is a San Jose, California company, founded in 1992, engaged in the development of next generation wireless technology. It is the world leader in the development and commercial deployment of “smart antennas,” employing spatial signal processing technology. Deployed in more than 30,000 base stations worldwide for a variety of air interfaces, this technology provides significant coverage and spectral efficiency benefits to all types of wireless systems. Operationally, these benefits make it possible to build out and operate wireless networks providing advanced services with minimized cost and spectrum requirements leading, in turn, to increased affordability and accessibility for the public.

2. ArrayComm has been an active participant in this proceeding because of the suitability of the spectrum under consideration for economic deployment of advanced wireless

technologies and advanced mobile data services. Because Time Division Duplexing (“TDD”) methods are ideally suited to both wireless data applications -- in which uplink and downlink traffic are not necessarily symmetrical, as in the case of circuit-switched voice -- and to extracting maximum benefits from smart antennas, ArrayComm has made a number of recommendations in this proceeding with the goal of helping to create a technologically neutral set of rules that will foster the introduction of innovative and beneficial technologies.

3. Responding to points ArrayComm and others made concerning the proposed rules, the Commission in the *Reconsideration Order* chose to limit EIRP on the basis of device type rather than band segment. In doing so, the Commission equalized the value of the band segments for TDD applications in the sense that TDD macrocellular deployments could be supported in either band segment (which was not previously the case).

4. Motorola’s Petition argues that the operation of higher power base stations in the upper segment of the 700 MHz commercial band significantly increases the interference potential between commercial systems operating at 700 MHz and spectrally adjacent Public Safety systems. In particular, as the upper commercial band segment borders the Public Safety uplink band from below, Motorola asserts that the uplink “noise-plus-interference” floor of Public Safety base station receivers will be adversely affected by higher power commercial systems operating in the upper segment within several miles, therefore resulting in a loss of fringe coverage for Public Safety services.

5. ArrayComm wishes to emphasize at the outset that it supports the protection of Public Safety systems in the 700 MHz band. And it does not contest the notion that an increased power limit in the upper commercial band segment may result in an operational increase in out-of-

band emissions (“OOBE’s”) presented to the Public Safety uplink in certain situations, although in any event those OOBE’s will continue to be below the limits the Commission set earlier in this proceeding. ArrayComm’s position, however, is that Motorola’s analysis is based, in many respects, upon unduly pessimistic assumptions possible and is not representative of the situation to be expected in most operational deployments.

6. Motorola’s most pessimistic assumption is that the commercial systems will employ a 6.25 kHz bandwidth. This is implicit in Motorola’s interpretation of the $76 + 10 \log P$ attenuation requirement as meaning that interference power of -76 dBW per 6.25 kHz would be presented by a commercial system’s base station to a Public Safety base station. In fact, wireless data systems or other 3G systems are the most likely commercial services to be deployed in this band. These systems will almost surely use significantly larger bandwidths than 6.25 kHz. Correct OOBE calculations account for this disparity in channel bandwidth. For example, NTIA’s January 5, 2000, filing in this docket more reasonably supposes a 1.25 MHz bandwidth for the commercial service and correctly reduces the -76 dBW peak theoretical OOBE by a factor of $10 \cdot \log_{10}(1.25 \text{ MHz}/6.25 \text{ kHz})$ or 23 dB, the ratio of the bandwidths. Using Motorola’s own free-space path loss equation, this 23 dB difference results in minimum separation distances that are in fact reduced by 93% from those suggested by the Motorola analysis. It is noteworthy that in the NTIA analysis cited above, base station to base station interference scenarios similar to those examined by Motorola, and with the identical maximum permissible interference criterion, were considered. All such scenarios examined during that study, moreover, incorporated the assumption that the commercial base station was operating at the maximum permissible EIRP. That analysis concluded that the minimum separation distance, again at the maximum EIRP and assuming base station

antenna gain of less than 13 dBd, lay between 3% and 13% of the value derived in the Motorola analysis.

7. Motorola's assumptions regarding propagation between the antennas of the two systems' base stations are similarly pessimistic and cannot be expected to be representative of typical deployments. Motorola assumes free-space propagation loss between the commercial and Public Safety systems' base stations with a 0 dB clutter correction. Pervasive line-of-sight propagation between base stations is not an appropriate assumption for a general analysis. Especially in urban settings, where the highest commercial base station density is to be expected, line-of-sight between the two systems' base stations will certainly not be the norm. The square-law, line-of-sight, loss model should therefore be modified, for example, by adding an appropriate clutter factor. TIA/EIA/TSB88-1, at Table 11, "Wireless Communications Systems - Performance Technology-Independent Modeling, Simulation, and Verification," provides a range of clutter correction values for differing environments. In a residential setting, for example, that document prescribes a 20 dB correction factor, which yields an additional 90% percent reduction in required separation distance when inserted into Motorola's model. 20 dB may be overly optimistic for the typical case, but it is clear that an unobstructed line-of-sight model is not representative. Even a 5 dB clutter correction for non line-of-sight conditions results in a 44% reduction in separation requirement. One could also make the case that a loss exponent of greater than two would better account for non line-of-sight conditions than the addition of a clutter correction to the square-law model. With this alternative model, the required separation distances would be exponentially less than those stated in the Motorola document.

8. Still another pessimistic assumption of Motorola's analysis relates to the misalignment of antenna patterns of Public Safety and commercial systems. Cellular base station antennas are generally deployed with mechanical or electrical downtilt and at lower heights above average terrain than those of Public Safety base stations. This leads to a misalignment or pointing error between the vertical patterns of those systems' antennas. This misalignment generally becomes more marked as the antenna gains of the systems increase. Motorola did not account for this factor in its analysis. Ascribing a typical loss of 5 dB to this factor results in an additional 44% reduction in the required separation distance between base stations as compared to Motorola's analysis.

9. Finally, given the relatively good propagation characteristics at 700 MHz and the probable capacity intensive nature of the commercial applications deployed in that band, we note that commercial base stations may not generally operate at the maximum power permitted by the rules, as their cell size generally may be capacity limited rather than range limited. This reduction in EIRP would be accompanied by a reduction in out of band emissions, and a corresponding decrease in any potential interference to Public Safety services.

10. As ArrayComm and others have shown in this proceeding, TDD technology is ideally suited to data applications and extracts the maximum benefit from recent technological developments, including smart antenna technology. The Reconsideration Order's specification of EIRP on the basis of device type rather than band segment was an important step in creating technologically neutral service rules which will foster the introduction of innovative and beneficial technologies. Despite the motivation for the rule change, it is important to note that the issue at hand has nothing directly to do with TDD, but is rather an issue of emissions limits.

11. Motorola's request that the Commission reverse its rule modification, and prohibit higher power base station operation in the upper band segments, would be a step backward which Motorola has simply not justified. ArrayComm supports the protection of Public Safety systems through appropriate service rules; however, Motorola's analysis is both unreasonably pessimistic in its assumptions and fails to consider significant engineering factors which mitigate the potential for interference between the two sets of systems.

Respectfully submitted,
ARRAYCOMM, INC.

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September 15, 2000

CERTIFICATE OF SERVICE

I, Marc GoldBurg, Director of New Technologies, ArrayComm, Inc., hereby certify that I have on this 15th day of September, 2000, caused to be sent by first class U.S. mail, copies of the foregoing "OPPOSITION TO PETITION FOR RECONSIDERATION" to the following:

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